

Agenda Item

Cherokee Canal Habitat Rehabilitation Project

Agenda Description

Consider the approval of Resolution 08-08 for the Cherokee Canal Habitat Restoration Project (Project) granting the authorization to delegate the Executive Officer the authority to provide a letter to the U.S. Army Corps of Engineers regarding its continued interest and financial capability to be the non-federal sponsor of the Project under the cost-shared Continuing Authorities Program Section 1135 of the Water Resources Development Act of 1986.

Project Location

The Project is located approximately 10 miles northwest of Oroville in Butte County within the Sawmill Ravine watershed. The Cherokee Canal, a channelized portion of Dry Creek, flows into Butte Creek, which is a tributary of the upper Sacramento River. A map showing the project location is provided in Plate 1.

Project History

Sediment created as a result of hydraulic mining operations from the mid 1800s to early 1900s accumulates in portions of the Cherokee Canal. Prior to 1916, the Old Cherokee Debris Dam prevented sediment from collecting in the Cherokee Canal and other downstream reaches of Dry Creek. Since the failure of the Cherokee Debris Dam in 1916, sediment has continued to collect in the downstream reaches of Dry Creek and Cherokee Canal.

The quality of habitat in Dry Creek and Cherokee Canal has degraded as a result of the build up of sediment over the years. There has been a significant decline in the riparian and wetland habitat along portions of Dry Creek, which has resulted in issues such as the loss of wildlife and fish migration corridors along reaches. In addition to environmental degradation issues, flooding issues along portions of Dry Creek have also started to occur due to a loss of downstream flow capacity.

The Army Corps of Engineers has stated that they would like to partner with the Central Valley Flood Protection Board (Board) on this project. This partnership would result in a reduction of cost and maintenance responsibilities for both parties. The letter of intent to engage in a partnership for the project was sent to the Army Corps of Engineers on April 14, 2008 and is attached for reference.

Concurrent Projects

The Department of Water Resources is currently developing a project to remove approximately 500,000 cubic yards of sediment from a 3.5 mile segment of Cherokee Canal between the Southern Pacific Railroad Bridge and the Western Canal crossing at Cottonwood Creek. This section of the canal is not currently meeting the flood design capacity. The current

plan is to complete sediment removal in 2009. If the Cherokee Canal Habitat Rehabilitation Project is constructed as proposed, future sediment removal projects and habitat disturbance will be reduced.

Design

The Project proposes to investigate six restoration alternatives, which are described in the Preliminary Restoration Plan. These alternatives seek to achieve various degrees of habitat restoration to improve the environmental conditions along Sawmill Ravine, Dry Creek, and Cherokee Canal. Each alternative will be fully evaluated in the Ecosystem Restoration Report (ERR) phase based on the quantity and quality of restoration, the cost, and their effectiveness in reducing downstream sedimentation.

Need for Resolution 08-08

Operation of Cherokee Canal requires periodic maintenance to restore capacity by way of sediment removal. This maintenance results in loss of riparian and fish habitat at various locations, which causes fragmentation of fish and wildlife habitat within the Sacramento River Flood Control Project. In addition to the reduction in the quality of environmental habitat that the sediment collection in the Cherokee Canal causes, there is also a reduction in flood control reliability. Resolution No. 08-08 seeks to verify support to enact an alternative that improves both environmental quality and flood protection. The Resolution does not obligate the Board to enter into a Project Partnering Agreement, but provides the authority to support the Project.

Supporting documents contained in this packet

- Resolution No. 08-08
- Letter of intent sent from the Reclamation Board to USACE on July 17, 1996
- Letter of request to initiate study of project sent from the Reclamation Board to USACE on June 2, 1999
- U.S. Army Corps of Engineers (USACE) Preliminary Restoration Plan, 1999
- Letter sent to Army Corps of Engineers on April 14, 2008

Resolution No. 08-08

STATE OF CALIFORNIA
THE RESOURCES AGENCY
THE CENTRAL VALLEY FLOOD CONTROL BOARD

RESOLUTION NO 08-08

Provides the authorization to delegate the Executive Officer the authority to provide a letter to the U.S. Army Corps of Engineers regarding its continued interest and financial capability to be the non-federal sponsor of the Cherokee Canal Habitat Restoration Project under the cost-shared Continuing Authorities Program

WHEREAS, in 1996 the Department of Water Resources (DWR) performed a sediment removal project by way of dredging within Cherokee Canal as required by the Operations and Maintenance responsibilities prescribed by the U.S. Army Corps of Engineers (Corps); and

WHEREAS, it was determined by the Corps and the DWR that sediment accumulating in the Cherokee Canal results in costly maintenance that ultimately results in reduced quality of the environmental habitat in the region; and

WHEREAS, it was determined by the DWR that restoration projects which improve the environment also allow for savings on maintenance costs in the Cherokee Canal; and

WHEREAS, on July 17, 1996 a letter of intent to become a non-federal sponsor of the Cherokee Canal Fish and Wildlife Habitat Restoration Project was sent from the Reclamation Board to the Corps;

WHEREAS, on June 2, 1999 a letter was sent from the Reclamation Board to the Corp of Engineers to request a reconnaissance study evaluating the excessive sediment deposition in the Cherokee Canal;

WHEREAS, because Water Code section 8361 gives the Department of Water Resources responsibility for maintaining the Cherokee Canal channel, a non-State local sponsor does not exist for this work; and

WHEREAS, the Non-Federal Sponsor share for this project is 25% of the total project costs less Land, Easements, Rights of Way, Relocation and Disposal Areas (LERRDS) in accordance with Section 1135 of the Water Resources Development Act of 1986; and

WHEREAS, the Government and Non-Federal Sponsor desire to enter into the Project Partnership Agreement in the near future to construct the Cherokee Canal Habitat Restoration Project.

NOW, THEREFORE, BE IT RESOLVED that the Central Valley Flood Protection Board delegates to the Executive Officer its authority to provide a letter to the U.S. Army Corps of Engineers regarding its continued interest and financial capability to be the non-federal sponsor of the Cherokee Canal Habitat Restoration Project under the cost-shared Continuing Authorities Program, Section 1135 of the Water Resources Development Act of 1986.

DATED:

BY:_____.

President

BY:_____.

Secretary

Approved as to Legal Form
And Sufficiency

_____.

Counsel for The Central Valley Flood Protection Board

**Letter of intent sent from the Reclamation Board to USACE
July 17, 1996**

THE RECLAMATION BOARD

1416 NINTH STREET, ROOM 1801

SACRAMENTO, CA 95814

(916) 853-5434 FAX: (916) 853-5805

Permits: (916) 853-5728 FAX: (916) 853-5805



Jun 2 1999

[Jun 2 1999]

Colonel Michael J. Walsh
District Engineer
Sacramento District
U.S. Army Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

Dear Colonel Walsh:

This is to request the U.S. Army Corps of Engineers to initiate a reevaluation or reconnaissance study of the ongoing excessive sediment deposition in the Cherokee Canal located in Butte County.

The Cherokee Canal Project was built by the Corps in 1959 and 1960 and is currently maintained by the Department of Water Resources. Levees are frequently overtopped, subjecting persons and property to flood damage. The primary reason for overtopping is the large sediment load coming from an old upstream hydraulic mine that reduces the channel's flood-carrying capacity.

DWR has expended several million dollars on this small channel to remove sediment. Most recently, in 1996, DWR spent \$1.5 million to remove approximately 200,000 cubic yards of mining debris. We believe that the original design of Cherokee Canal did not properly consider the ongoing sediment deposition problem. Consequently, a reevaluation to determine whether there is a design deficiency would be appropriate.

On July 17, 1996, The Reclamation Board sent a letter of request to the Sacramento District of the Corps to become the nonfederal sponsor of a Section 1135 restoration project above the Cherokee Canal Project. A copy of that letter is attached. A written response was never received.

Also attached are two letters from the Butte County Board of Supervisors, representing Butte County and Western Canal Water District, requesting an initial general investigation by the Corps for analysis of preventing sediment deposition or hydraulic mining debris into the Cherokee Canal.

Colonel Michael J. Walsh

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If you have any questions, please contact me at (916) 653-5434, or your staff may contact Larry Lee, Chief, Flood Project Analysis Section B of DWR's Division of Flood Management, at (916) 654-4422.

Sincerely,



Peter D. Rabbon
General Manager

Attachments

cc: The Honorable Walley Herger
Representative, U.S. Congress
2433 Rayburn House
Office Building
Washington, DC 20215

Mr. Matt Colwell, Manager
Western Canal Water District
Post Office Box 190
Richvale, California 95974

Mr. Mike Crump
Director of Public Works
County of Butte
7 County Center Drive
Oroville, California 95965

Mr. Dennis Lindberg
Gardensherr, Incorporated
1096 Middlehoff Lane
Oroville, California 95965

Mr. Stuart Edell, Manager
Land Development Division
Butte County Public Works Department
7 County Center Drive
Oroville, California 95965

Ms. Jane Dolan, Chair
Butte County Board of Supervisors
Administration Center
25 County Center Drive
Oroville, California 95695

Mr. Raymond E. Barsch
Executive Officer
California Water Commission
1416 Ninth Street, Room 1148
Sacramento, California 95814

Mr. Homer Lundberg
Lundberg Family Farms
Post Office Box 369
Richvale, California 95974-0369

JUL 17 1996

Colonel John N. Reese
District Engineer
Sacramento District
U.S. Army Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

Post-It™ Grand fax transmittal memo 7671		# of pages = 3
To: Patrick Engel	From: Larry Lee	
Co.	Co.	
Dept.	Phone # 654-4422	
Fax # 557-7856	Fax # 654-9589	

Dear Colonel Reese:

The Reclamation Board intends to become the nonfederal sponsor of the Cherokee Canal Fish and Wildlife Habitat Restoration Project. This project will convert severely disturbed gravel/hydraulic mining debris captured within the 300 400-acre sediment basin created by the historic debris dam into functional wetland and riparian vegetation. The work will include modification of the historic debris dam to optimize creation of the wetland/vernal pool and riparian habitat. A detailed operation and maintenance procedure will be developed to assure preservation of the wetland/vernal pool and riparian habitat created.

The historic debris dam was constructed under permit by the California Debris Commission, now the U.S. Army Corps of Engineers, in 1900. The Annual Report for the California Debris Commission describes this dam as "an earthen dam faced with brush." A. W. Mellon, et al, was the permit applicant and the dam was constructed to capture mining debris from Cherokee Mine. A significant amount of hydraulic mining debris has been trapped and accumulated to a depth in excess of 15 feet behind the debris dam.

This project will restore the wetland/vernal pool and riparian habitat which existed before construction of the debris dam. The modification will create diverse habitat types, will provide nesting and migration habitat for migratory waterfowl and resident birds, and habitat for other wildlife, including several federal- and State-listed endangered species. This restoration project will also control massive nonpoint source sedimentation and preserve beneficial downstream uses, including preserving approximately 840 acres of riparian habitat present in the waterway. The continuous inflow of hydraulic mining debris into the Cherokee Canal channel results in a loss of flood capacity and associated increased risk to public safety and the need for costly and environmentally disruptive sediment and gravel removal within the flood control channel. The restoration will be done in cooperation with the Corps under the authority of Section 1135 of the Water Resources Development Act of 1986, Project Modifications for Improvement of the Environment.

Colonel John N. Reese

JUL 17 1996

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The Board understands the responsibilities of being the nonfederal project sponsor. Specifically, pending legislative authorization, the Board is prepared to assume responsibility for (1) all lands, easements, rights-of-way, relocations, suitable borrow and disposal sites and (2) twenty-five percent of the total project costs in accordance with Section 1135 of Public Law 99-662. As a condition of our participation, we will be seeking a local entity to assume operation and maintenance responsibilities upon project completion. The extent and terms of the Board's participation will be contained in the Project Cooperation Agreement between the Board and the Corps.

The Board will continue to work closely with the Corps to develop this restoration project. If you have any questions, please contact me at (916) 653-5434 or Michelle Lewis at (916) 327-1608.

Sincerely,

ORIGINAL SIGNED BY

Raymond E. Bersch
General Manager

cc: (See attached list.)

bcc: Lucinda Chipponeri
Assistant Director for Legislation

MMLewis:Shannon Burns

Text Area:I:\MMLEWIS\CHER1135.RV2

Spell Check: July 12, 1996

Honorable Tim Leslie
Member of the Senate
Post Office Box 3280
Chico, California 95927

Honorable Bernie Richter
Member of the Assembly
2545 Zenella Way, Suite D
Chico, California 95928

Honorable Douglas P. Wheeler
Secretary for Resources
The Resources Agency
1416 Ninth Street, Room 1311
Sacramento, California 95814

Mr. David N. Kennedy, Director
Department of Water Resources
1416 Ninth Street, Room 1118-1
Sacramento, California 95814

Ms. Jacqueline E. Schafer, Director
Department of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, California 95814

Ms. Suzanne Marr
U.S. Environmental Protection Agency
Region 10
75 Hawthorne Street
San Francisco, California 94105

Mr. Wayne S. White, State Supervisor
U.S. Fish and Wildlife Service
2800 Cottage Way, Room E-1803
Sacramento, California 95825-1846

Mr. James C. Pedri
Assistant Executive Officer
Shasta Cascade Watershed
California Regional Water Quality
Control Board
Central Valley Region
415 Knollcrest Drive, Suite 100
Redding, California 96002-0101

Mr. J. Michael Crump
Director of Public Works
County of Butte
7 County Center Drive
Oroville, California 95965

Mr. Dennis Lindberg
Gardensherr, Inc.
1096 Middlehoff Lane
Oroville, California 95965

Ms. Lynn Barris
2830 House Avenue
Durham, California 95938

Mr. Homer Lundberg
Lundberg Family Farms
Post Office Box 369
Richvale, California 95974-0369

Mr. Paul Maslin
Department of Biological Sciences
California State University, Chico
Chico, California 95929

Mr. John B. Merz
Sacramento River Preservation Trust
Post Office Box 5366
Chico, California 95927

Mr. Scott Murphy, Conservation Director
Streaminders Chapter
Post Office Box 3051
Chico, California 95927

Mr. Pat Gore
Post Office Box 28
Durham, California 95938

**Letter of request to initiate study of project
Sent from the Reclamation Board to the USACE
June 2, 1999**

**USACE Preliminary Restoration Plan
1999**

Section 1135 Preliminary Restoration Plan

1. Project: Cherokee Canal Habitat Restoration Project, California. PWI No. (To be assigned). This restoration project is in California's 2nd Congressional District.

Two Corps of Engineers' projects have been constructed on Dry Creek within the study area. The Old Cherokee Debris Dam was constructed in 1900 under the authority of the California Debris Commission, a special regulatory board of the Corps (Plate 1). The Cherokee Canal, part of the Sacramento River and Major and Minor Tributaries Project, was constructed in 1960.

2. Location: The proposed restoration site is located approximately 10 miles northwest of the city of Oroville in Butte County, California, within the Dry Creek/Cherokee Canal watershed. Oroville is located approximately 68 miles north of Sacramento. Dry Creek/Cherokee Canal flows into Butte Creek, a tributary of the upper Sacramento River.

3. Description of Proposed Project: The primary purpose of this project is to improve the environment along Sawmill Ravine, Dry Creek, and Cherokee Canal, but significant flood control maintenance savings would result with increased flood control reliability in the Cherokee Canal. Environmental decline within this part of the watershed is primarily due to the accumulation of hydraulic mining debris that was washed down from the Old Cherokee Hydraulic Mine higher in the Sawmill Ravine watershed. The channelization of Dry Creek to form Cherokee Canal has led to further degradation of the watershed along the lower reaches. This degradation is exacerbated and prolonged because of high sedimentation rates within the Cherokee Canal, and the resulting periodic dredging of Cherokee Canal that is required to maintain channel capacity. Operation of Cherokee Canal requires periodic maintenance dredging that results in loss of riparian and fish habitat. This restoration project would improve the quality of the environment beyond the area of construction by reducing the influx of sediment and the need for maintenance dredging of Cherokee Canal. Additionally, there would be an indirect flood control benefit through the implementation of this project.

During active hydraulic mining of the Cherokee Mine between 1854 and 1916, approximately 51 million cubic yards of sediment were washed into Dry Creek (the unchannelized upper reach of Cherokee Canal). The Old Cherokee Debris Dam project was intended to halt the flow of hydraulic mining debris into the Sacramento River, but failed in 1916 and has never been repaired. Hydraulic mining sediment is accumulated to depths in excess of 15 feet within the debris basin that formed behind the dam. The debris dam no longer impedes the flow of water in Dry Creek.

The Cherokee Canal was constructed on lower Dry Creek to reduce flooding to adjacent agricultural lands. Flooding occurred along Dry Creek because of the loss of stream capacity due to downstream reaches being filled with sediment. The Old Cherokee Debris Dam was initially constructed to reduce sedimentation to downstream reaches, but after it failed, other measures were needed to help control the flooding which resulted from sediment accumulation. The Cherokee Canal

project resulted in the straightening and channelization of Dry Creek with the intent to carry excess sediment through the system and thereby reduce flooding to adjacent agricultural lands.

The reach of Dry Creek upstream of the Old Cherokee Debris Dam has been seriously degraded due to the deposition of large volumes of hydraulic mining debris from the Cherokee Mine within the sediment basin created by the Old Cherokee Debris Dam. This debris caused a significant decline in riparian and wetland habitat along a 0.5-mile reach of Dry Creek plus a 1-mile reach of Sawmill Ravine, a tributary to Dry Creek (Plate 2). One facet of the environmental degradation that has occurred as a result of this mining debris is that wildlife and fish migration corridors have been fragmented. The poor habitat quality in this reach creates a barrier to fish and wildlife passage from the Sacramento River to the foothills of the Sierra Nevada by fragmenting the ecosystem. This restoration project would help to create a more continuous migration corridor for fish and wildlife from the Sacramento River to the upland and foothill regions.

The goal of the proposed restoration project is to restore natural riparian and wetland habitat within the sediment basin and the Cherokee Canal. Some potential project features which may be implemented include excavation and removal of hydraulic mining sediment along Dry Creek and Sawmill Ravine to establish a natural meander belt; restoration of the natural flood plain of Dry Creek and Sawmill Ravine in the vicinity of the old debris basin; establishment of riparian habitat along the creek; planting of upland habitat to help stabilize the mining debris; and creation of ponds which would have the benefit of acting as a sediment trap to help reduce the influx of sediment into the Cherokee Canal. A reduction of sedimentation would have a three-fold benefit to the ecosystem: (1) fish egg survival rates would increase because spawning gravels would not become buried by excessive sediment; (2) a reduction of sediment input into Cherokee Canal would reduce maintenance dredging and would therefore reduce disruption to the habitat that becomes established in the canal; and (3) a reduction of sedimentation would prevent further declines in the carrying capacity of the Cherokee Canal and therefore improve flood damage reduction in the area.

Expected Outputs: The intent of the project is to restore the physical (channel hydraulics and wetland hydrology) and biological (aquatic, mixed riparian shrub, and wetland communities) components of this reach of Dry Creek and Sawmill Ravine which have been degraded by past human activity. Additionally, the project would contribute to an improved wildlife and fish migration corridor by creating a more continuous belt of habitat from Cherokee Canal and the foothills of the Sierra Nevada. The potential outputs of the project include the following items and associated wildlife values:

- Up to 2 miles (10,560 lineal feet) of restored stream channel.

This would increase the amount of spawning habitat for steelhead, nonnatal rearing habitat for spring-run chinook salmon, and resident and neo-tropical birds. Spring-run salmon currently migrate and spawn in Butte Creek, to which Cherokee Canal is a tributary. Cherokee Canal and Dry Creek are used for nonnatal rearing habitat by chinook salmon that hatch in Butte Creek.

Additionally, this output would result in increased quantity and diversity of aquatic invertebrates by providing a range in hydraulic characteristics, especially through sequences of pools, riffles, and meander bends. This variability in hydraulic characteristics allows for a greater range in habitat, and thus species.

Flood damage reduction may also result from restoring the stream channel by attenuating the flows through the system.

- Up to 20 acres of restored riparian habitat.

Riparian habitat would accomplish several goals. Erosion would be reduced through the stabilizing effects of tree and plant roots. This would help reduce the influx of sedimentation to downstream reaches, thereby reducing the need for sediment removal and improving water quality. By reducing dredging needs, there is a reduction of disturbance of habitat within and adjacent to Cherokee Canal.

This output would also restore lost foraging habitat for various wildlife species that depend on riparian corridors for food. This includes avian species such as the yellow-billed cuckoo, osprey, American kestrel, Swainson's hawk, bald eagle, American peregrine falcon, and bank swallow. Terrestrial species that would benefit from this include foothill yellow-legged frog, giant garter snake, willow flycatcher, red-legged frog, southwestern pond turtle, and valley elderberry longhorn beetle.

- Up to 40 acres of restored floodplain.

It has been demonstrated that floodplains are a critical component of riparian ecosystems. As waters flow over floodplains, silts and sands are deposited which helps reduce sedimentation downstream, improves water quality, and renews the nutrients of the floodplain soils. Additionally, floodplains allow multi-generational vegetative cover through the dispersal of seeds during floods from upstream and nearby plants, and the removal of diseased and weakened plants. This maintains a vigorous and healthy riparian corridor.

- Up to 20 acres of restored wetland habitat.

Wetland habitat has been greatly reduced throughout the Central Valley over the past 100 years. Wetland habitat is critical to the existence of many Federally and State-listed species in the Central Valley including the yellow-billed cuckoo, osprey, American kestrel, Swainson's hawk, bald eagle, American peregrine falcon, bank swallow, foothill yellow-legged frog, giant garter snake, willow flycatcher, red-legged frog, southwestern pond turtle, and valley elderberry longhorn beetle.

Wetlands also provide important recharge to local aquifers, and help improve water

quality by filtering out toxins and sediment.

- Increased shaded riverine aquatic (SRA) cover.

SRA habitat provides feeding and cover for aquatic species such as steelhead and salmon. SRA cover also maintains low instream temperatures that are necessary for salmon and steelhead habitat.

- Removal of invasive exotic plant species such as yellow starthistle.

Invasive plant species have the ability to outcompete native plant species. They typically do not provide the quality and type of habitat necessary for many of the Federally and State-listed species. Also, highly successful invasive plants can reduce the diversity of vegetative cover.

- Restore fish habitat for threatened and endangered species such as Central Valley steelhead and spring-run chinook salmon and possibly other listed wildlife species.

The proposed project would also improve the natural habitat of the project area, improving the water quality of Dry Creek, Cherokee Canal, the Sacramento River, and the San Francisco Bay and Sacramento-San Joaquin Delta (Bay/Delta). Another benefit of this project is a reduced risk of flooding of the Cherokee Canal. A large amount of mining debris is transported downstream from the old debris basin to the Cherokee Canal where it is deposited. As explained above, the Cherokee Canal was constructed with the intent of conducting flood flows and affording approximately 50-year flood protection to the surrounding agricultural land. Deposition of sediment in the canal and resulting loss of capacity have hindered this function. The California Department of Water Resources spent \$1.5 million in 1996 to remove excessive sediment transported into Cherokee Canal from Dry Creek and Sawmill Ravine in order to maintain the flood control project design capacity.

Importance of Proposed Outputs: Riparian forests are among the most biologically rich communities in western North America. Riparian vegetation in the Sacramento River system and its tributaries supports diverse plant and animal communities. Additionally, riparian habitat provides an important corridor for movement of wildlife throughout the region. Continuity of habitat is important for the dispersal, migration, and movement of wildlife through the region. Fragmentation of fish and wildlife habitat decreases its utility as a migration corridor, which can lead to loss of species diversity within the fragments, both by increasing local extinction rates and by excluding from fragments those species which require large areas of habitat. Essential to the movement of wildlife between the mainstem of the Sacramento River and regions of upland habitat are the tributaries of the Sacramento River. The current condition of Dry Creek and Cherokee Canal at this location contributes to the fragmentation of the overall ecosystem and thus a decline in migratory corridors.

The extent of wetlands in the Central Valley of California has declined by as much as 95 percent, and the amount of riparian forests has declined by as much as 98 percent over the past 100

years. The historic wetlands and riparian vegetation supported various wildlife species endemic to the area, including Federally and/or State-listed endangered species such as the yellow-billed cuckoo, osprey, American kestrel, Swainson's hawk, bald eagle, American peregrine falcon, bank swallow, foothill yellow-legged frog, giant garter snake, willow flycatcher, red-legged frog, southwestern pond turtle, valley elderberry longhorn beetle, Central Valley steelhead, and spring-run salmon.

Riparian forest and woodland communities are increasingly important as breeding and rearing habitat for a variety of terrestrial and aquatic species, and as resting and foraging habitat for migratory waterfowl and songbirds. Riparian corridors provide essential migratory conduits for species dependent on riparian and foothill environments to breed and forage. Additionally, riparian habitat in this area of the Sacramento Valley plays an essential role in the health and productivity of the Pacific Flyway, one of the most important flyways in North America. This flyway is vital for both resident and migratory waterfowl, shorebirds, and neotropical birds.

The Corps and the Reclamation Board of the State of California have recently completed Phase I of the Sacramento and San Joaquin River Basins Comprehensive Study that resulted in the Interim Report which was presented to Congress in March 1999. The stated mission of the Comprehensive Study is to develop a system-wide, comprehensive flood management plan for the Central Valley to reduce flood damage and integrate ecosystem restoration. This proposed Section 1135 project is consistent with this mission by providing for ecosystem and floodplain restoration with an incidental benefit of reduced local and downstream flooding.

CALFED is a similar effort that is focused on improving the water and ecosystem quality of the Bay/Delta while making water supply more reliable and reducing the flood risk to the entire system from breaching Delta levees. Though the focus is on the Bay/Delta system, the program is intended to support actions throughout the Sacramento and San Joaquin River systems. This proposed project would improve the ecosystem and reduce sedimentation problems, and is fully compatible with CALFED objectives.

LERRD Requirements: The proposed project area is about 80 acres (Plate 2). The project site is currently owned by a gravel mining company. Land use around the project site is rangeland. Estimated value of rangeland in the project area is \$450 to \$875 per acre; this range includes contingencies for administration and severance. Based on a high estimate of \$875 per acre, the estimated upper limit of the land costs for the project is \$70,000. This figure is an upper limit of land costs and may be less because the sponsor has expressed that they only wish to own an easement on the property so as to minimize interference with gravel operations. Gravel operations would continue on areas adjacent to the project site, but not on the project site itself. The project would be designed so that there is a buffer area between the project and the gravel mining so that mining does not damage restoration measures. This cost estimate for the LERRDs represents about 1.1 percent of the estimated \$6.6 million total project cost.

Relationship of Proposed Project to Other Federal Projects: The proposed project is related to the Old Cherokee Debris Dam (no longer in use) and the Cherokee Canal, both of which are Corps

projects. The proposed project is fully compatible with the Cherokee Canal, and would enhance its effectiveness in conveying flood flows by reducing sediment input and thereby reducing loss of channel capacity. The proposed project is also consistent with the objectives of the Sacramento and San Joaquin River Basins Comprehensive Study and the CALFED Bay/Delta program as described above.

Alternatives: The following alternatives could achieve various degrees of habitat restoration. They will be fully evaluated in the Ecosystem Restoration Report (ERR) phase based on the quantity and quality of restoration, the cost, and their effectiveness in reducing downstream sedimentation.

- § Alternative 1 - No Action. No modifications would be made to Dry Creek/Cherokee Canal. No improvements to the ecosystem and riparian corridor along Dry Creek or Sawmill Ravine would be achieved. The riparian corridor would remain fragmented. Native plant species and communities are expected to remain in small, isolated patches. These small areas may potentially decline in size and complexity due to continued competition with nonnative invasive species. Subsequent nonnative populations would likely increase in size and persistence, making future eradication challenging. Associated native terrestrial and aquatic species would remain in decline due to limited high quality native habitat. Water quality in Dry Creek/Cherokee Canal and the Sacramento River would remain in its current state. High sedimentation rates would continue to reduce the capacity of the Cherokee Canal.
- § Alternative 2 - Partial Removal of Hydraulic Mining Debris from the Sawmill Ravine/Dry Creek Floodplain (Plate 3). The intent of this alternative is to remove the source of the sediment, thereby reducing the downstream movement of the sediment. Upon completion of the removal of the sand and gravel, the floodplain and stream would be restored. The historic streambed grade would be restored and regraded to create a stable channel. This alternative would necessarily entail revegetating the floodplain and streambanks. Riparian habitat would increase providing potential benefits to a variety of aquatic, avian, and land species. Riparian pathways would be more continuous therefore providing migration corridors to animals. Bank stability would increase and the influx of sediment to downstream reaches would decrease. This would improve downstream habitat quality and water quality. Additionally, a reduction of sedimentation to the Cherokee Canal would reduce the need for instream dredging, thereby reducing the risk to downstream habitat. Further losses of channel capacity within the Cherokee Canal would be reduced because of the reduction of sediment influx.

This alternative is not intended to eliminate mining within the entire debris basin, but is only intended to remove the excess debris from the portion of land along the creek that is determined, in the ERR phase, to be part of the historic floodplain. The removal of this debris and regrading may possibly be accomplished in the negotiations to obtain easements on the land for the project. Sediment removal and regrading required to reconstruct the historic channel and floodplain could be done by the surface sand and

gravel mining operation that currently owns the land. It will be necessary to fully consider all debris removal and regrading options during the ERR phase to arrive at a project with high environmental restoration and associated flood control benefits.

- § Alternative 3 - Restoration of the Floodplain of Sawmill Ravine and Dry Creek and Construction of Sediment Basins for Sediment Removal (Plate 4). The intent of this alternative is to trap sediment as it moves downstream, thereby reducing influx of this sediment into the Cherokee Canal. This alternative would focus on minimizing disturbances of the majority of the riparian areas by creating controlled sediment collection and removal areas. Planting of willows, alders, and other riparian vegetation would occur in the upper portions of the project reach. This would improve habitat along this reach of Sawmill Ravine and Dry Creek. Within the lower portions of the project reach, sediment catchment basins would be created to allow for entrapment and removal of the sediment. The number, sizes, shapes, and maintenance requirements of these basins will require coordination with the California Department of Fish and Game to resolve any possible fisheries issues. Interspersed with the sediment basins, riparian vegetation would be planted. Riparian habitat would increase and sediment influx would decrease. Two types of sediment basins could be considered under this alternative, those that lie directly within the stream channel, and those that lie outside the stream channel. Those situated within the channel which would become filled with sediment through direct overflow of the stream. Sediment would then be removed periodically by the sponsor. Conversely sediment basins could be located outside the stream channel would passively fill through the construction of a sediment siphon. Previously constructed examples of this will be fully studied in the ERR phase, such as the sediment "vortex sampler" that is currently being used through a demonstration project on Spanish Creek in Plumas County, California. This vortex sampler provides a method for passive gravel mining, which therefore decreases disruption to riparian vegetation. If the stream channel migrates over time, sediment basins and/or the vortex sampler could be relocated if necessary to maintain an effective collection of sediment.

Operations and maintenance (O&M) costs incurred to remove sediment in the proposed project would be offset by the reduction in costs for maintenance of the Cherokee Canal Flood Control project. Currently, there are high costs to remove sediment from the Cherokee Canal because of stringent environmental restrictions and mitigation requirements. Maintenance dredging of the Cherokee Canal could be reduced, and a portion of the maintenance could be shifted to the constructed settling basins. Sediment removal required to maintain the constructed settling basins could be done by the surface sand and gravel mining operation that currently owns the land. This may possibly be accomplished in the negotiations to obtain easements on the land for the project. It will be necessary to fully consider all maintenance options of the sediment basins during the ERR phase to arrive at a project with high environmental restoration and associated flood control benefits.

The sediment settling basins could be located in several locations: along Sawmill

Ravine where the majority of the gravel is located and gravel mining operations are currently ongoing; along Dry Creek just upstream of the Nelson Road bridge; and along Dry Creek just downstream of the Nelson Road bridge; or sediment basins could be placed in all of these locations. Sediment basins along Sawmill Ravine have the advantage of trapping the sediment at the source and creating a simple management tool for the removal of the sediment. Sediment basins located at either of the sites downstream have the advantage of trapping sediment close to the location where it is naturally being deposited. This may more effectively lead to the removal of the major sediment size that is filling in Cherokee Canal.

- § Alternative 4 - Dredging the Cherokee Canal between Nelson Road and Richvale East Road and Construction of a Low-Flow Channel within the Confines of the Levees that is Geomorphically Compatible with the Local Terrain (Plate 5). Subsequent to channel excavation, the stream would be replanted with riparian vegetation. This alternative would provide significant restoration benefits because it would result in a more natural channel with significant riparian vegetation, while simultaneously providing significant flood damage reduction by increasing the capacity of the stream channel. The intent of this alternative is to maintain flood capacity by constructing a channel that is capable of transporting a majority of sediment out of the system and thus reducing the need for highly disruptive maintenance projects.

The O&M of this redesigned channel would be key to the success of this alternative and would have to include an agreement between the U.S. Fish and Wildlife, Reclamation Board, California Department of Fish and Game, Butte County, and local landowners. Once a channel with riparian habitat is established within the confines of the Cherokee Canal, Butte County and local farmers would be responsible for channel maintenance. This would include removal of deposited sediment, but would not allow for the removal of riparian vegetation or disruption of habitat. The frequency of O&M activities will be developed during the ERR phase.

- § Alternative 5 – Combine Alternatives 2 and 4. This alternative would restore both the upper and lower reaches of the stream as described above. This alternative would simultaneously restore the stream while addressing erosion and sedimentation problems. The sedimentation reduction would occur by removing the source of the sediment and stabilizing the floodplain through planting.
- § Alternative 6 – Combine Alternatives 3 and 4. This alternative would restore both the upper and lower reaches of the stream as described above. This alternative would simultaneously restore the stream while addressing erosion and sedimentation problems. The sedimentation reduction would occur by trapping sediments that have been eroded in constructed catchment basins.

Study Methodologies: During the ERR phase, a geomorphic approach would be used to determine the design characteristics of the channel restoration. A functional assessment of the project

watershed as it relates to stream morphology would be performed to determine the appropriate range of restoration measures and the channel design approach. Hydrologic, hydraulic, and sediment transport conditions would be analyzed to establish locations for the meander geometry and define cross sections and other stream parameters to be restored. A hydrologic analysis would be performed on the project reach to describe flow-frequency and flow-duration relationships as well as quantify pertinent flows such as the normal low flow and critical seasonal flows. A combination of empirical and analytical methodologies would be used to establish the variable planform, cross-sectional, and profile characteristics of the design channel. Empirical methods would be used to estimate the initial channel configuration and may include hydraulic geometry relationships, regime equations, target channel stream classification, and analog design.

A Habitat Evaluation Procedure analysis would be used to quantify fish and wildlife habitat outputs. An incremental analysis would be performed to determine the most cost effective and beneficial restoration alternative.

4. Consistency Statement: The purpose of the Corps' 1960 construction of Cherokee Canal was flood control. The proposed restoration project would not adversely affect the original project, nor would it reduce its flood carrying capacity. The proposed project would help maintain the flood-carrying capacity of the Cherokee Canal by decreasing an influx of sediment into Cherokee Canal at a considerable flood control maintenance cost savings to taxpayers.

The Old Cherokee Debris Dam failed in 1916 and was never repaired. This restoration project would reduce the sedimentation problems that the Old Cherokee Debris Dam was intended to solve.

5. Views of Sponsor: Attached is a letter dated 2 June 1999 from the Reclamation identifying its willingness to be the non-Federal sponsor (Enclosure 3). Accompanying this letter is an earlier letter from the Reclamation Board stating its willingness to be responsible for 25 percent of the total project cost. The State is strongly supportive of restoring ecosystem values of Dry Creek/Cherokee Canal at the project site.

6. Views of Federal, State, and Regional Agencies: The restoration work would contribute to the goals and objectives of the Sacramento and San Joaquin River Basin Comprehensive Study and the CALFED Bay/Delta Program, and is supported by Butte County.

7. Status of Environmental Compliance: An environmental assessment would be completed to comply with Federal regulations, including the National Environmental Policy Act, and an initial study would be completed in compliance with the California Environmental Quality Act and incorporated into the Section 1135 ERR. The U.S. Fish and Wildlife Service would be coordinated with in accordance with the Fish and Wildlife Coordination Act.

8: Costs and Benefits:

Costs. (1) Preparation of the ERR (including an environmental document) - \$660,000; (2) preparation of plans and specifications - \$600,000; (3) project construction (including supervision and administration, LERRDs, and monitoring) - \$5.34 million; the total estimated cost for the project is \$6.6 million. The estimated costs for O&M of the project are \$10,000 per year.

The ERR cost for this project of \$660,000 represents about 10 percent of the estimated total project cost. The high costs associated with the ERR are due to the comprehensive analysis needed for a hydraulic model. A hydraulic model with this level of detail is necessary to understand sediment transport in this river system. An understanding of sediment transport in the Dry Creek/Cherokee Canal system is required to attain environmental benefits. A reduction in sedimentation is a required output of the project by the sponsor. Project construction costs (\$5.34 million) were also based on similar Corps projects. The total project cost is below the Section 1135 limit of \$6.66 million.

Benefits: The proposed project is expected to result in substantial and varied outputs and benefits, which are described in Section 3 (above). The outputs would include up to 2 miles of restored aquatic stream habitat for fish, 20 acres of restored mixed riparian habitat for birds, 20 acres of restored wetland habitat, and 40 acres of restored floodplain. In addition, incidental benefits of improved water quality to Dry Creek/Cherokee Canal, the Sacramento River, and the Bay-Delta region may be seen as a result of reduced sediment influx, and the water filtering aspect of healthy wetlands. Finally, incidental flood control benefits may also be realized through the construction of sediment basins within the constructed floodplain of the stream. The proposed project would contribute to the goals of the Sacramento-San Joaquin Comprehensive Study and the CALFED Bay/Delta Program by restoring SRA habitat along a tributary of the Sacramento River.

9: Schedule:

Task	Start Date	End Date	Duration	FY
Prepare ERR & Draft PCA	Jan 00	Aug 01	20 months	00-01
Approve ERR & Draft PCA	Aug 01	Sep 01	1 month	01
Prepare Plans & Specifications	Sep 01	Feb 02	5 months	01-02
Approve Project & Execute PCA	Feb 02	Mar 02	1 month	02
Purchase & Certify LERRDs	Mar 02	Feb 03	10 month	02-03
Advertise & Award Contract	Feb 03	Jun 03	4 months	03
Construct Project	Jun 03	Jun 04	12 months	03-04
Post-Construction Monitoring	Jun 04	Jun 07	36 months	04-07
TOTAL PROJECT	Jan 00	Jun 07	89 months	00-07

Post-construction monitoring would be conducted for 3 years following project construction to determine if the predicted outputs are being achieved. Post-construction management would be flexible enough to allow for changes in policy that become evident upon monitoring. A draft monitoring plan would be developed during the ERR phase and finalized during the construction phase. During the ERR phase, minimum criteria for project outputs will be developed. These criteria will serve as a measurement for post-construction monitoring; any major deficiencies will be addressed at that time. The monitoring plan would likely include data collection; aerial photos; permanent vegetation transects, survey stations, and photo points; stations; channel surveys; aquatic/fisheries sampling; and preparation of a baseline report (after completion of construction) and quarterly monitoring reports. The key geomorphic features to be monitored after construction are: (1) the success of erosion control and sediment reduction measures, (2) the channel bed and bank topography and plan form through annual topographic surveys, (3) the bed substrate changes at riffles by conducting pebble counts, (4) water surface profiles during a range of flows, and (5) sediment transport measurements and observations.

10. Supplemental Information:

Existing Operation and Maintenance Practices: In 1996, the California Department of Water Resources completed a maintenance dredging project of Cherokee Canal as required by the Corps as part of O&M requirements for Cherokee Canal. This project disturbed approximately 54 acres of vegetation within and adjacent to the Cherokee Canal which was mitigated by the State. Maintenance dredging has had profound detrimental effects on the fish and wildlife habitat within and adjacent to the Cherokee Canal: turbidity is increased which in turn reduces water quality; and plant life is disturbed and modified, which profoundly affects wildlife and fish habitat. The proposed project modification would allow a diverse assemblage of habitat types to grow along Cherokee Canal that would go undisturbed. This riparian habitat would provide nesting and migration corridors for waterfowl, shorebirds, and resident and neo-tropical birds.

Hydraulic Mining: The hydraulic mining debris overlays the original ground level to a depth in excess of 15 feet within the old debris basin. Approximately one-half mile of the debris dam remains, but no longer crosses Dry Creek or intercepts its flow. The underlying formation consists of layered mudflow, silt, sand, and gravel deposits. Where sand and gravel deposits are exposed, water percolates into the area=s groundwater system. Where impermeable mudflow deposits are exposed, vernal pools can occur. The original (pre-hydraulic mining) habitat on the site probably included vernal pools; vernal pools are found in similar areas where this hardpan layer is present. No vernal pools are currently present on the site. Dominant understory vegetation is generally lacking; ground cover is dominated by star thistle and disturbed annual grasslands. Little riparian vegetation has become established along the stream. The small amount of streamside vegetation that does become established periodically is removed by flood flows over the highly erosive sediments. No significant functional, aquatic, emergent wetland, or riparian habitats are present. The absence of vernal pools and vegetation may also indicate a depressed water table in area, a symptom of the excess gravel in the stream and historic floodplain.

Flood Risks: Fields and crops, state and county highways, nearby houses and facilities, including a fertilizer storage facility in the town of Richvale, and the California Rice Experiment Station, in the town of Biggs are all put at risk from flooding of the Cherokee Canal. The Rice Experiment Station is a major rice research institute operated by the University of California Extension and a major supplier of rice seed to northern California. This project would reduce the risk of flooding to these facilities and properties.

11. Financial Data:

Ecosystem Restoration Costs (\$1,000)								
Task	Totals	Non-Federal (25%)	Federal (75%)	Federal Funding Needs				
				FY00	FY01	FY02	FY03	FY04
Report (ERR)	660	0 ¹	660	300	360			
Plans & Specs	600	0 ¹	600		300	300		
Construction	5,340	1,650 ²	3,690			0	1,850	1,840
Total	6,600	1,650	4,950	300	660	300	1,850	1,840

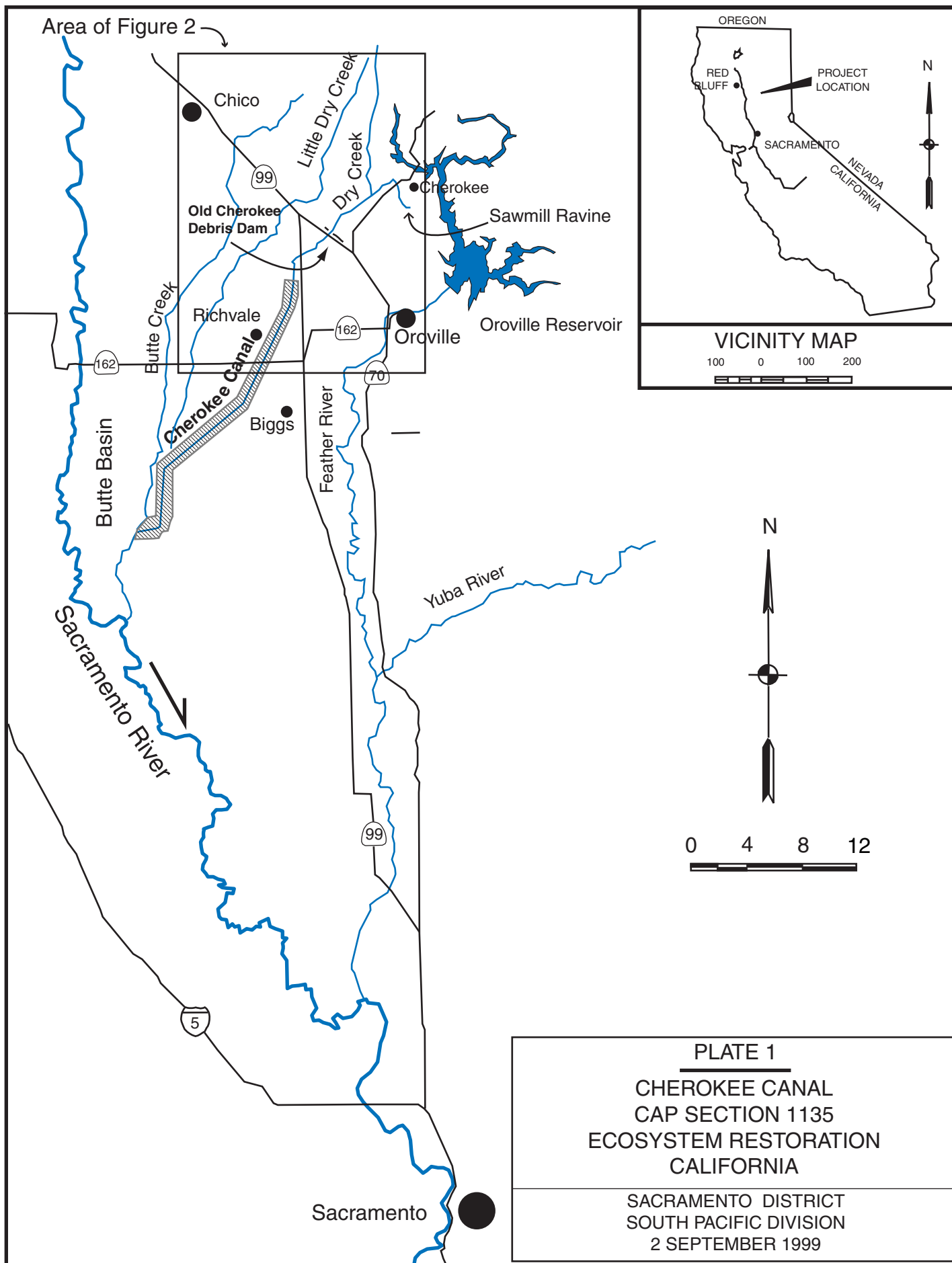
¹Report and Plans & Specs are initially Federally financed, and costs distributed as part of the non-Federal share of project costs during construction.

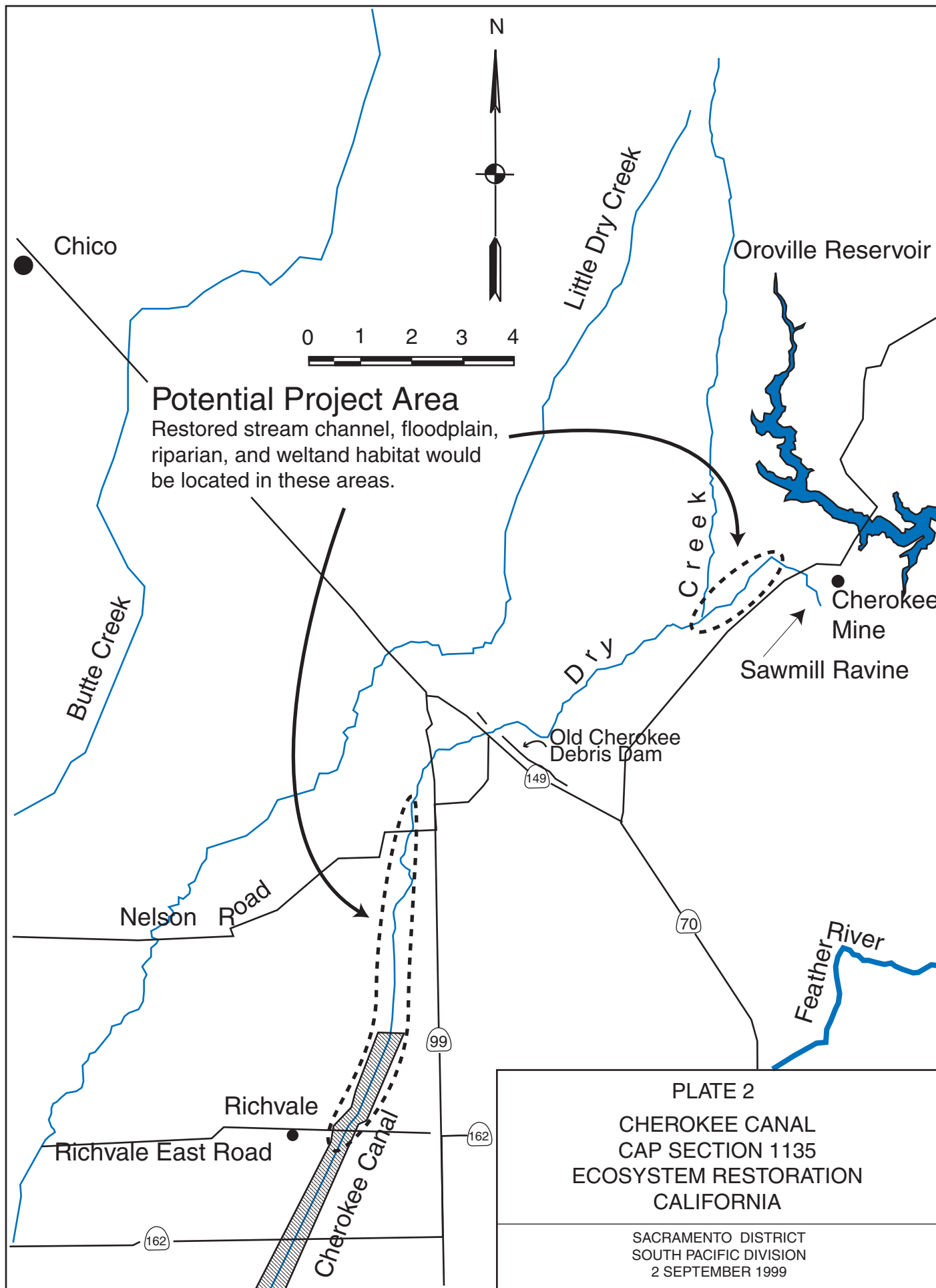
²Includes non-federal share of ERR and Plans & Specs reimbursement.

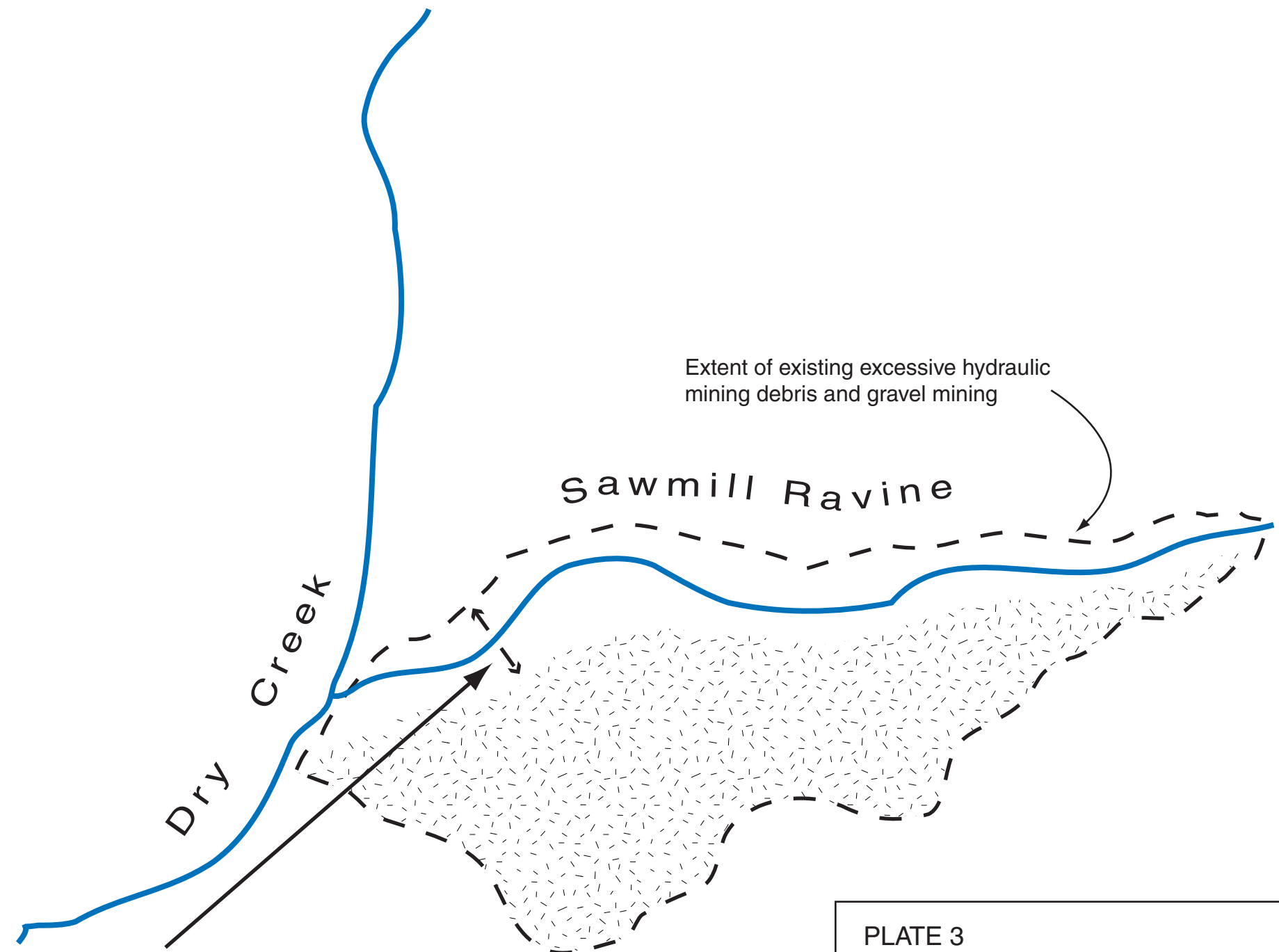
Estimated Non-Federal Requirements	
LERRDs	\$70,000
Cash/Work-in-Kind (25% less LERRDs)	\$1,580,000
Annual O&M	\$10,000

12. Federal Allocations to Date:

Ecosystem Restoration Report	\$0
Plans & Specifications	\$0
Implementation (Construction)	\$0







Excess sand and gravel would be excavated along the stream to create a stable floodplain. Banks would be stabilized with riparian tree and plant species.

PLATE 3

Conceptual Design of Alternative 2
Excavation of excess hydraulic mining debris
from the Sawmill Ravine floodplain.

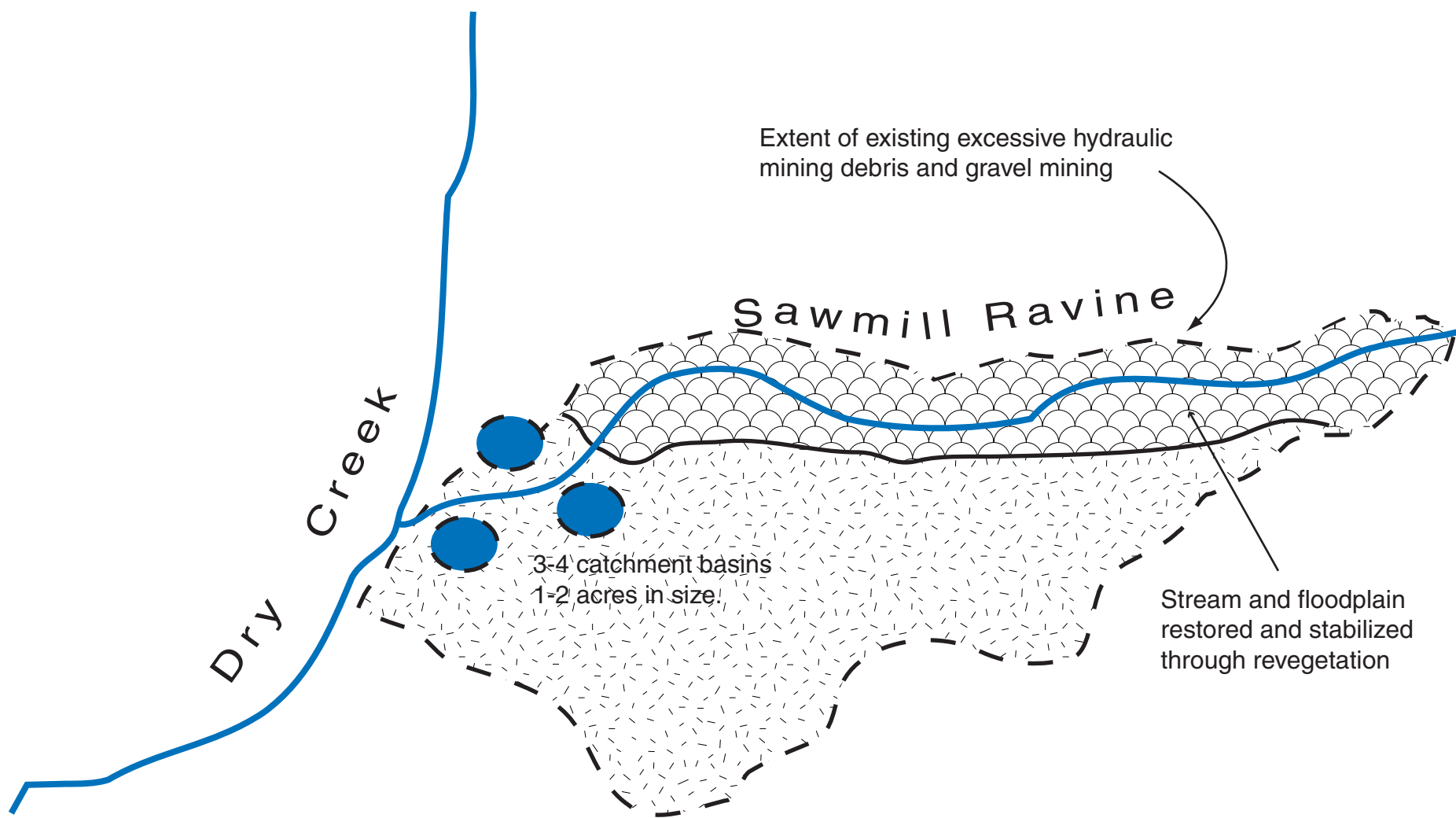
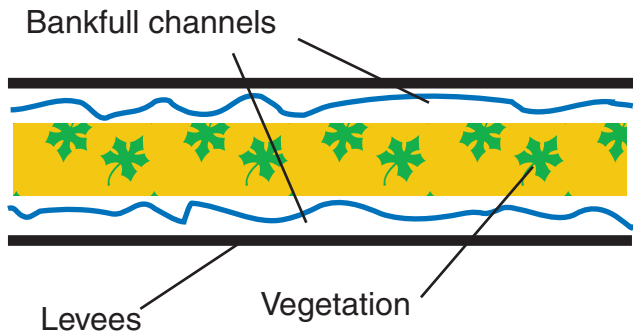
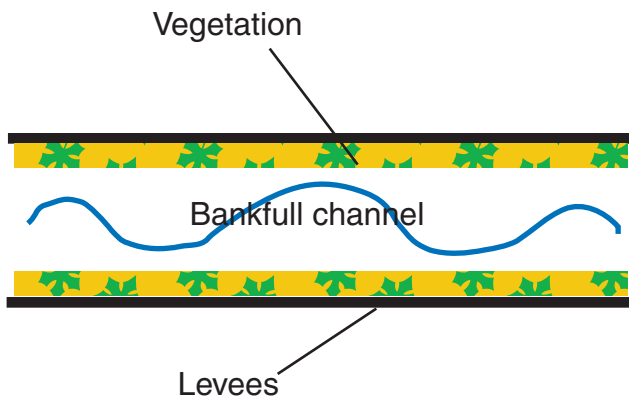


PLATE 4
Conceptual Design of Alternative 3
Restoration of the floodplain through
revegetation.



A: Without project conditions of Cherokee Canal. The canal has a central strip of trees, brush, and other vegetation with two channels that run down the sides of the canal. This configuration is the result of the mitigation required by the California Department of Fish and Game for the most recent dredging activities within the canal.



B: Alternative 4 would consist of creating a central channel with riparian vegetation planted along the levees on either side of the channel. This channel would be designed to transport sediment through the canal more efficiently than the current configuration. The benefits of this alternative would be a reduction of dredging activities within Cherokee Canal, which would decrease the disruption to riparian habitat.

PLATE 5

Conceptual Design of Alternative 4
Creation of a single low flow channel within
Cherokee Canal with riparian vegetation.

Letter sent to USACE
April 14, 2008

CENTRAL VALLEY FLOOD PROTECTION BOARD

3310 El Camino Ave., Rm. LL40
SACRAMENTO, CA 95821
(916) 574-0609 FAX: (916) 574-0682
PERMITS: (916) 574-0653 FAX: (916) 574-0682



April 14, 2008

Colonel Thomas C. Chapman
District Engineer
U.S. Army Corps of Engineers
Sacramento District Office
1325 J Street
Sacramento, California 95814
ATTN: CEPSK-PM-C

Dear Colonel Chapman:

This letter is to inform you that staff will be presenting a resolution to the Central Valley Flood Protection Board (Board) at their May 16, 2008 meeting to submit a letter to the Corps of Engineers (Corps) reaffirming the Board's support for Cherokee Canal Habitat Restoration Project (Project). This Project will be of great benefit to the Sacramento River Flood Control Project as it will reduce sediment deposition in the lower reaches of Cherokee Canal as well as enhance the ecosystem. For these reasons, it is supported by staff from both the Central Valley Flood Protection Board and from the Maintenance Branch of the California Department of Water Resources (DWR).

After the Board officially approves the Project, a letter of support will be provided reaffirming the Board's intention to enter into a partnership agreement with the Corps that lays out the responsibilities of the partners for sharing in the costs of the Project, acquiring necessary real estate interests, and performing necessary operation, maintenance, repair, rehabilitation, and replacement of the Project.

If you have any questions, you may contact Eric McGrath, System Integrity C Chief, Department of Water Resources, at (916) 574-2243.

Sincerely,

Jay S. Punia
Executive Officer